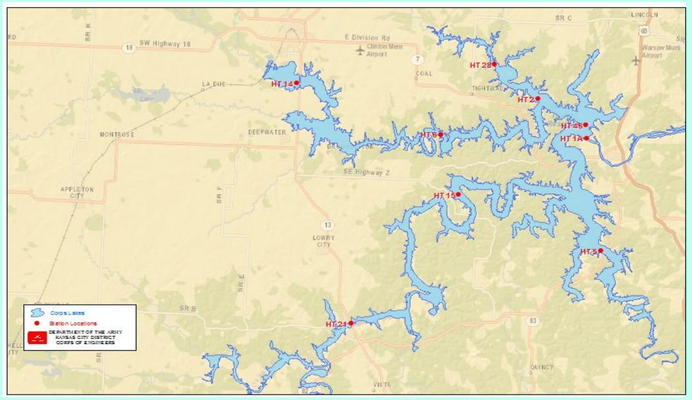
Harry S. Truman Lake Water Quality Summary

2006-2012

The US Army Corps of Engineers (USACE) Water Quality Program collects monthly water samples at Truman Lake* from April through September. These figures present data collected between 2006-2012 from nine lake sites (#2, 3 5, 6, 14, 15, 21, 28, 46) and the outflow (#1A) below the dam. Thirty-four chemical, physical and biological parameters are measured to evaluate water quality. USACE uses this data to describe conditions and changes from the inflow streams, within the main lake, and outflow focusing on eutrophication, nutrients, sediment, herbicides, metals, and contaminants.

*Note: The term "lake" is substituted for technically correct "reservoir" throughout this document for consistency.

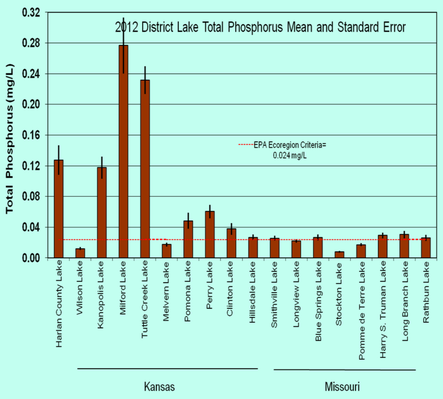


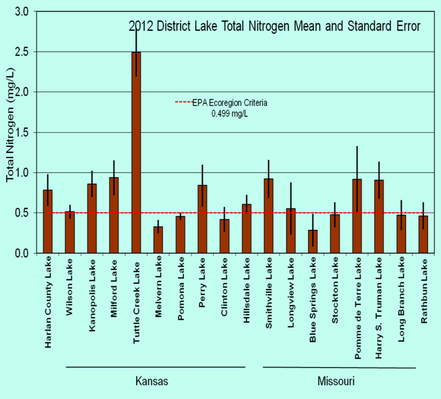
Truman Lake

- Built on Osage River reaching full pool in 1977.
- **Watershed** = 8,914 square miles/ 5,704,960 Surface Acres (SA)
- **Capacity**:
  - Flood Control: 4,005,392 Acre-feet (AF) / 209,048 SA
  - Multipurpose: 1,181,640 AF / 55,406 SA / 958 miles of shoreline
  - Avg. annual inflow (2003-2012) = 6,689,800 AF; 2012 Inflow = 3,020,780 AF
- **Project Operating Purposes**: flood control, hydropower, recreation, fish and wildlife, and water supply.
- **Water Quality** at Truman Lake in 2012 was beneficial to operating purposes listed above and measured parameters did not exceed MO State WQ Standards for designated uses. Water quality improves significantly as nutrients, herbicides and sediments are removed by settling, dilution, and biological processes as water moves from inflow streams to the dam. Western inflows originating in agricultural regions contribute higher nutrients and sediment to Truman Lake than inflow streams originating in Ozark border regions.

Nutrient Enrichment

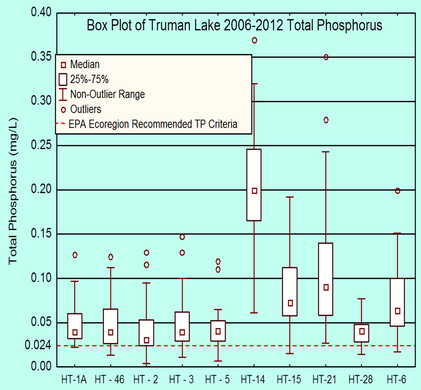
Nutrients (i.e. phosphorus and nitrogen) are essential for aquatic life and are the primary factor driving fish and aquatic plant growth rates and productivity. Excess nutrients from agricultural or natural sources increases the natural aging or eutrophication process in lakes. This can alter plant and aquatic life in lakes and water bodies, cause algal blooms and lead to low dissolved oxygen affecting fish and invertebrate survival. In 2012, Truman and other Missouri Corps' lakes ranked low in the Kansas City District for average nutrients measured at the site nearest the dam.

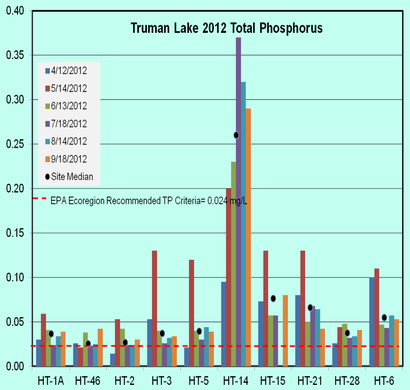




Total Phosphorus

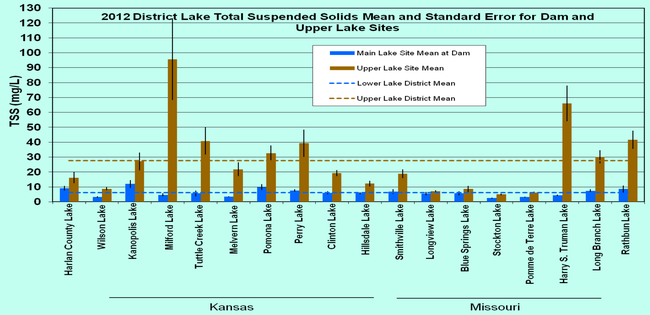
Truman Lake total phosphorus (TP) concentrations at most sites are near the low end of eutrophic range (0.024-0.096 mg/L) providing nutrients which benefit planktonic algae species and fish growth. Upper lake sites have higher total phosphorus than recommended by EPA ecoregion criteria, but negative effects such as fish kills and algae blooms have been minor. Median phosphorus concentrations in 2012 were similar to long term trends. HT-14 (upper S.Grand R. Arm) has the highest TP fed by flows from the S. Grand River. High levels of TP from upper lake sites like HT 14, 15, and 21 enter Truman Lake bound to suspended sediment particles and processed via biological attenuation before they reach lower lake sites as demonstrated by the decline in TP from HT14 to HT2.

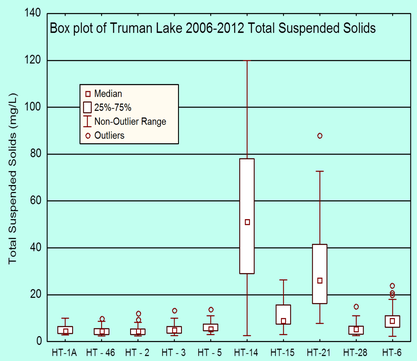


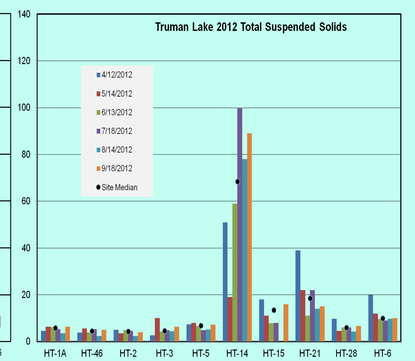


Total Suspended Solids

Total suspended solids (TSS) or filterable solids in streams and lakes is a function of watershed characteristics including soil composition, land use, weather patterns, and characteristics of inflowing streams. TSS may be an indicator of erosion in watersheds, sedimentation or filling rates of downstream reservoirs, and is also closely linked to nutrient and contaminant transport through river systems. Due to particle size and soil characteristics, a high percentage of suspended solids carried by streams settles out before it reaches lower end of the lake. In 2012, Truman mean TSS values measured from upper lake sites were the highest of District lakes. However 93% of TSS settled out as water moved from the upper lake to the dam. Five-year TSS trends show the highest values and high sample variation found in the west side of the watershed and negligible TSS from lower Truman Lake sites and outflow.

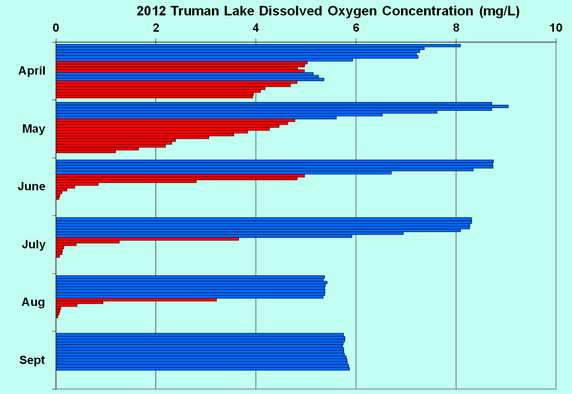






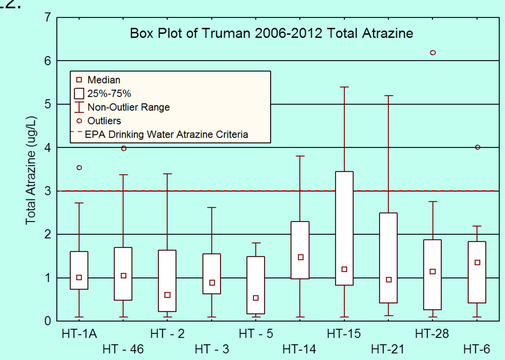
Dissolved Oxygen

Dissolved oxygen is a factor in aquatic species location, growth, and ultimately survival in lakes. The figure below shows dissolved oxygen measured in the water column at one-meter intervals from surface to bottom (e.g. each row in each month represents one meter of depth) from April through September. Truman Lake typically stratifies for a short period of the summer, however adequate (5 mg/L) dissolved oxygen is typically available in the lake. In 2012, Truman Lake had adequate oxygen in the top 5 meters during the worst conditions and stratified layers developed earlier than most years.



Herbicides-Atrazine

Herbicides (atrazine, alachlor, metachlor, cyanazine, and acetochlor) are sampled every three years from Truman Lake and inflows. Atrazine is the most widely used and most frequently detected herbicide throughout the Midwest and the only herbicide exceeding water quality standards at Truman Lake. Atrazine is dispersed throughout the water column, and must be removed for drinking water. From 2006-2012, total atrazine occasionally exceeded drinking water standards (3 ug/L) during spring sampling, which coincides with application and runoff. Median concentrations were less than 3 ug/L at all sites with 12 percent of samples exceeding EPA criteria were primarily from upper lakes locations from 2006-2012.



Fecal Bacteria

E. Coli is sampled and reported from seven Corps owned swim beaches on Truman Lake protective of whole body contact recreation during the summer. Large numbers of geese and wildlife can occupy Corps swim beaches leading to e. coli counts exceeding EPA Standards when sampling coincides with high water levels or recent rain events. In 2012, Truman Lake beach samples did not exceed MO. water quality standards (235 CFU/100ml). Beaches at Truman Lake are infrequently closed due to e. coli populations, but have not been linked to chronic problems or poor water quality in the watershed.

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